PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

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A Reconnaissance Survey of Gaylard Creek and Bull Trout Habitat Suitability, 1994

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1998

PWFWCP Report No. 140

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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ABSTRACT

A reconnaissance survey of Gaylard Creek was conducted in the summer of 1994 to: 1. assess fish habitat;
2. determine if a bull trout transplant to Gaylard Creek is feasible;
3. verify presence of fish populations; and
4. determine feasibility of construction of fish passage structures in Gaylard Creek.

Gaylard Creek provides suitable habitat for salmonid populations, including bull trout. A rainbow trout population descendant from a stocking in 1983 is present. Inspection of the waterfalls and cascades in the lower 2 km of the creek (Reach 1) identified them as barriers to upstream fish passage, and that construction of fish passage structures is not feasible.

INTRODUCTION

Gaylard Creek is tributary to Gething Creek (Fig. 1) which flows into Dinosaur Reservoir located in north-east British Columbia. A waterfall, located 500 m upstream from the mouth of Gething Creek, is a barrier to upstream fish movement (plate 1). Once past this waterfall, fish could access the mouth of Gaylard Creek (plate 2). Rainbow trout (3,150 juveniles) were stocked into Gaylard Creek in 1983 by the Ministry of Environment.

Previously unsurveyed, Gaylard Creek was believed to contain adequate fish habitat, but was not known to be accessible to fish from Dinosaur Reservoir due to natural obstructions. Gaylard Creek was examined in the summer (July - October) of 1994 to obtain the baseline information required to allow for sound management practices, identify habitat limitations, and potential enhancements.

In late August, bull trout from Dinosaur Reservoir congregate at the base of the first waterfall on Gething Creek. The useable spawning habitat below the waterfall is limited, and recruitment is likely low due to floods associated with storms and spring snow melt. The Peace/Williston Fish and Wildlife Compensation Program (PWFWCP) implemented a transplant program to enhance this wild bull trout stock. In 1993, twelve bull trout in spawning condition were transplanted from below the first waterfall on Gething Creek to a site on Gething Creek approximately 7 km upstream of the waterfall. Once the adult fish had spawned they were recaptured and transported back to Dinosaur Reservoir. Electrofishing was used in 1994 to capture young of the year bull trout indicating that spawning was successful.

The first objective of this survey is to assess the suitability of fish habitat in Gaylard Creek prior to initiating a bull trout transplant in 1994. Second, it is essential to determine if barriers to fish passage exist in Gaylard Creek, and if so, determine if construction of fish passage structures is a viable enhancement option. Third, is to determine if rainbow trout have successfully populated Gaylard Creek, and if any other fish species are present.

This study will provide the baseline information required for the management, protection, and possible enhancement of the fish values of Gaylard Creek. Key aspects examined will be spawning and rearing habitat, identification of barriers to fish movement, and verification of fish presence. From the results of this study, limiting factors to salmonids may be identified and potential enhancement projects recommended.

Figure 1. Gaylard Creek watershed

Plate 1: Aerial view of first waterfall on Gething Creek.

Plate 2: Aerial view of Gaylard (right stream) entering Gething.

METHODS AND MATERIALS

Study Area

Gaylard Creek is located within the Dinosaur Reservoir watershed situated in northeastern British Columbia (Fig. 1). The confluence of Gaylard and Gething Creek is located approximately 2 km south-west of the W.A.C. Bennett Dam.

Fish Capture

A battery powered backpack electroshocker was used to capture fish. The electroshocking was carried out in a single pass upstream fashion (without stopnets) to sample fish species present. Length, weight, and scale samples were obtained and fish were released at the capture site.

Water Temperatures

Water temperatures were recorded with a digital recording thermometer (Ryan Instruments TempMentor). The unit is certified accurate to ± 0.3° C. Water temperatures were recorded at two hour sampling intervals. The thermograph in Gaylard Creek was placed 100 m upstream from the bridge crossing at km 0.7 of the Table Creek Forest Service Road (Fig. 2). The thermograph was set on July 9, 1994, and removed on October 17, 1994. The site was checked occasionally to ensure the thermograph unit was completely submerged and operating properly.

Ground Surveys

Stream characteristics were recorded on Department of Fisheries and Oceans and Ministry of Environment and Parks, Stream Survey Forms (Appendix I). Data was collected in accordance with procedures outlined in the Stream Survey Field Guide (DFO/MOEP, 1987). Biophysical data sheets were also used to record additional stream features (Appendix II). Distances were measured with a 50 m Eslon tape. Slopes were measured with an Abney level and a 2 metre measuring stick. Pictures were taken of any barriers to fish movement.

Aerial Reconnaissance

On July 9, an aerial survey, utilising a 206 Bell Jet Ranger helicopter, was conducted on the mouth of Gething Creek and all of Gaylard Creek. A video camera installed on the helicopter was used to create a permanent record of all the stream characteristics. The video tape was viewed to evaluate the fish habitat within the stream. Still pictures of the stream characteristics and any visible barriers that may impede upstream fish movement were also taken.

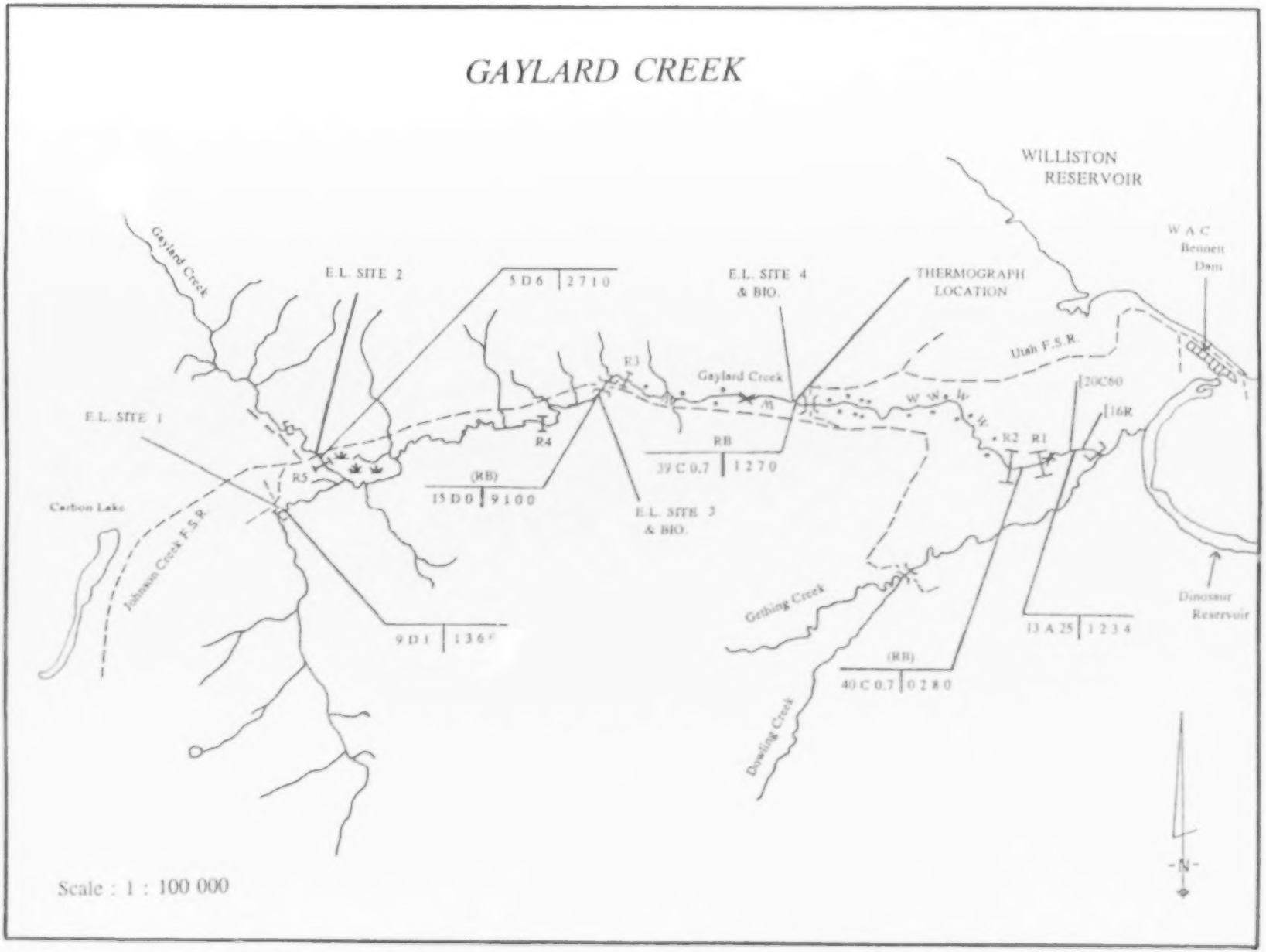

Fig. 2. Gaylard Creek habitat biophysical map (legend contained in Appendix IV).

RESULTS

Fish Capture

Four sites were electroshocked on Gaylard Creek. One rainbow trout juvenile was captured in Reach 3, 100 m upstream of the bridge crossing at the kilometre 0.7 point of the Table Creek Forest Service Road (Fig. 2). No other fish species were captured. Detailed electroshocking site data is contained in Appendix III.

Water Temperatures

During the 101 day sampling period, the mean water temperature was 8.9 °C (Table 1). The maximum water temperatures in Gaylard Creek occurred in August (Figure 3).

Table 1. Mean water temperature (°C) by month and sampling duration.

Location	Recording Period	July	Aug.	Sept.	Oct.	Duration (101 days)
Gaylard Cr.	July 9 - Oct. 17	10.5	10.5	8.3	4.5	8.9

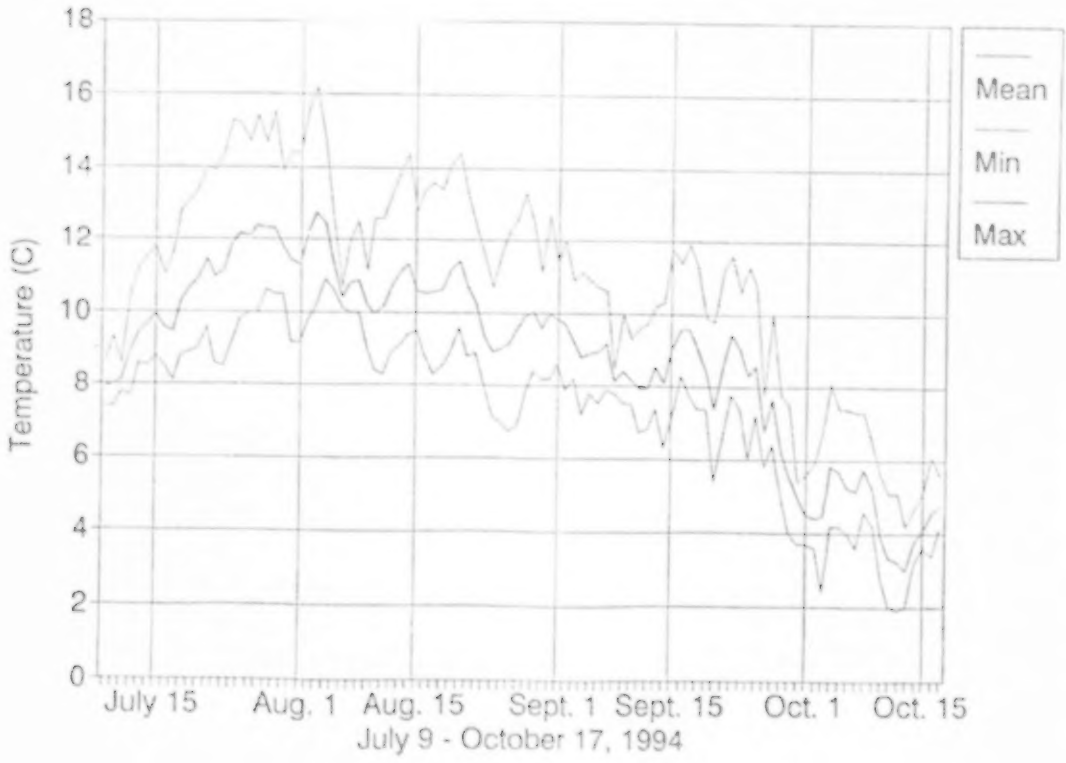

Fig. 3. Gaylard Creek water temperatures.

Ground Survey and Aerial Reconnaissance

The video tape, and results of the habitat surveys, and electroshocking, were utilised to create a biophysical map of Gaylard Creek (Fig. 2).

One site with numerous redds was discovered near the Johnson Creek Forest Service Road bridge (Fig. 2). Careful examination of one redd confirmed egg presence. Species was not determined, but egg size and colour was consistent with rainbow trout.

The video tape of Gaylard Creek is located, and may be viewed, at the address provided on the inside front cover of this report. Upon review of the video tape, Gaylard Creek was divided into six reaches (Table 2). Two reaches (2 and 5) were documented on stream survey forms using only aerial reconnaissance data (Appendix I). Aerial estimates of stream characteristics for Reaches 2 and 5, particularly the substrate breakdowns, may not be as accurate as the other reaches where ground surveys confirmed the habitat composition. Stream gradient, and surveyed length for Reaches 2 and 5 were determined by map interpolation.

Table 2. Summarized stream characteristics of Gaylard Creek by reach

Reach	Reach Length	Surveyed Length	Method	Channel Width	Wetted Width	% Pool	Gradient	Substrate Composition (percentage)			
								Fines	Gravel	Cobble	Bedrock
1	1.3 km	1,300 m	ground	13 m	11 m	10	9.0%	10	20	30	40
2	0.8 km	800 m	aerial	40 m	8 m	10	1.0%	0	20	80	Trace
3	9.5 km	386 m	ground	30.5 m	10 m	10	0.9%	10	20	70	0
4	2.7 km	460 m	ground	14.5 m	14.5 m	60	0.0%	90	10	0	0
5	7.0 km	7,000 m	aerial	lo m	7 m	80	0.5%	90	10	0	0
6	3.3 km	200 m	ground	5 m	5 m	0	2.0%	20	70	10	0
Trib.	1.6 km	200 m	ground	9 m	9 m	5	1.0%	10	30	60	0

Reach Descriptions

For each reach identified, a description of the habitat suitability for fish is indicated. The description provided for each reach is based upon an amalgamation of data obtained from ground surveys, aerial surveys, electroshocking, and National Topographic Service 1:50,000 scale maps. Boundaries (upstream and downstream) are presented in Universal Transverse Mercator grid format. Gaylard Creek is believed to contain only rainbow trout (descendants of the 1983 stocking) . Bull trout may be transplanted to Gaylard Creek pending the results of this survey. Therefore, all habitat suitability evaluations are directed towards these two salmonid species.

Reach 1

Length = 1.3 km
Downstream boundary = 10.5470.62063
Upstream boundary = 10.5458.62060
Location: From confluence with Gething Creek upstream through the canyon to a point approximately 6 km downstream of Table Creek FSR bridge crossing.

Reach 1 is entrenched in a very deep and narrow 1.3 km long canyon. Mean channel width is 13 metres. Substrate consists of bedrock and cobble/boulders. The banks are rock cliffs averaging approximately 40 m in height. Many cascades and waterfalls were observed in the canyon (plate 3). The first waterfall (16.2 m height, plate 4) is located 500 m upstream from the mouth. A cascade with a 20 m vertical drop over a 60 m horizontal distance is situated in the middle of this canyon section. A log jam (plates 5 & 6) was discovered in the upper portion of the canyon with the entire creek flowing through a 1.5 m wide chute underneath the logs. Upstream fish passage throughout this section is impossible and downstream passage would likely be fatal for larger adult fish. Juvenile fish may be able to survive the falls. Presence of deep pools, or flat bedrock, at the base of the waterfalls was not determined.

Reach 2

Length = 0.8 km
Downstream boundary = 10.5458.62060
Upstream boundary = 10.5452.62059
Location: From approximately 6 km downstream of Table Creek FSR bridge crossing to approximately 5 km downstream of Table Creek FSR bridge crossing.

This short reach is no longer entrenched by canyon rock walls. Mean channel width has increased to 40 metres. The stream bed consists of large cobble and gravel with a few bedrock outcroppings. The channel appears to be fairly stable and no signs of flooding were evident. Along the water's edge, large substrate and forest vegetation provide good bank stability. Shallow, riffle habitat is predominant and no pools or slow moving sections are present. Large woody debris, and associated instream cover is non-existent. Forest crown closure is 60%, providing overstream cover for most of the day. Instream cover is limited to small shallow pools behind boulders and bedrock outcroppings. Habitat is probably restricted to rearing of smaller salmonids.

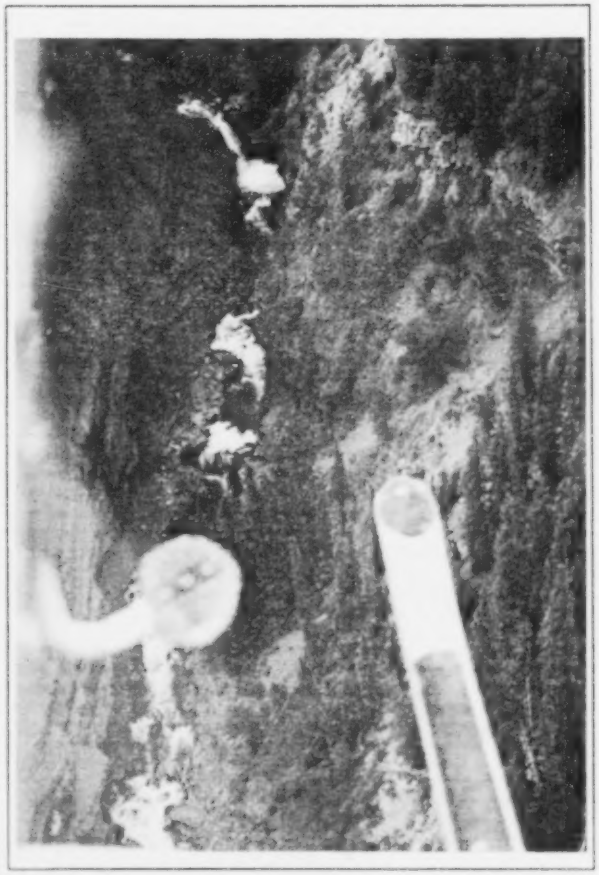

Plate 3: Aerial view of falls and cascades in Reach 1 of Gaylard Creek.

Plate 4: View of 16.2 m falls located 500 m upstream from the mouth of Gaylard Creek (Reach 1).

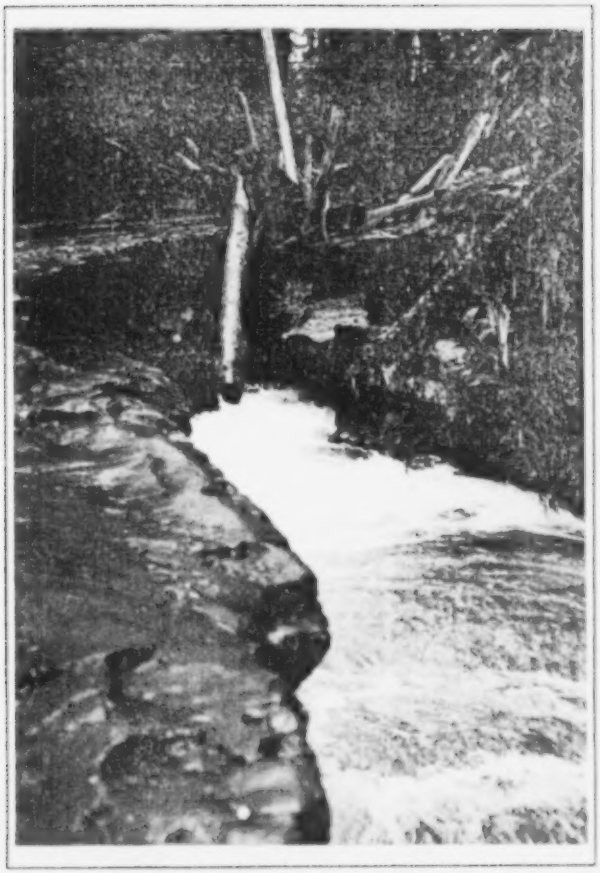

Plate 5: Upstream view of log jam in Gaylard Creek (upper Reach 1).

Plate 6: Downstream view of log jam in Gaylard Creek (upper Reach 1).

Reach 3

Length = 9.5 km
Downstream boundary = 10.5452.62059
Upstream boundary = 10.5375.62067
Location: From approximately 5 km downstream of Table Creek FSR bridge crossing to 1 k m downstream of Johnson Creek FSR bridge crossing.

Reach 3 is a series of shallow riffle/glide sequences. Extensive flooding and unstable banks are characteristic of this reach. Frequent large slumping banks consisting of larges and gravel are present. Numerous bars are present. The main channel meanders through large flood plains. A few remnant stream channels were observed. Substrate consists primarily of larges and small cobble. No instream large woody debris is present. All woody debris has been deposited on the edges of the floodplains by flooding events. Overstream forest cover is absent. Instream cover is restricted to the broken water surface and small sheltered pockets/pools on the downstream side of the boulders. This reach may provide good rearing habitat for juvenile salmonids. Habitat suitability for adult salmonids appears to be low.

Reach 4

Length = 2.7 km
Downstream boundary = 10.5375.62067
Upstream boundary = 10.5356.62069
Location: From approximately 1 km downstream of Johnson Creek FSR bridge crossing to approximately 2 km upstream of Johnson Creek FSR bridge crossing.

Reach 4 is a slow moving section of glides and runs with some deep pools. The banks of the stream are approximately one to two metres in height, vegetated, with little or no signs of erosion. Bank material is predominantly fines, indicating stability is a result of the low gradient. Overstream cover (crown closure) varies from a low of 5 % , to nearly 100% in some areas. Fines content is high in the slow moving pools. Suitable spawning gravel was noted in riffle/glide areas between pools. Redds were discovered (approximately 10, likely rainbow trout) at one location. A careful examination of one redd confirmed egg presence. This reach affords excellent habitat values for use by all life stages of salmonids.

Reach 5

Length = 7.0 km
Downstream boundary = 10.5356.62069
Upstream boundary = 10.5314.62064
Location: From approximately 2 km upstream of Johnson Creek FSR bridge crossing to approximately 1 km downstream of the culvert crossing at the 57.5 km. point on the Johnson Creek FSR.

Reach 5 is a network of several branching and reuniting channels meandering through a low lying swampy area. The valley bottom which the stream flows through is half open marshes/ponds, and half forested. Large ponds and areas flooded by beaver dams were observed. This area shows no signs of storm or snow melt high water flooding events. Large woody instream debris is abundant. The low gradient main channel is not evident in some locations of this reach due to excessive braiding. Fish passage, or blockage, could not be determined for Reach 5. This reach acts as a catchment basin for numerous tributaries and the upper reaches of Gaylard Creek. Reach 5 affords excellent rearing habitat for juvenile and adult salmonids. Spawning habitat is likely to be very limited.

Reach 6

Length = 3.3 km
Downstream boundary = 10.5314.62064
Upstream boundary = 10.5299.62078
Location: From approximately 1 km downstream of the culvert crossing at the 57.5 km point on the Johnson Creek FSR to approximately 2 km upstream of the culvert crossing at the 57.5 km point on the Johnson Creek FSR. The upstream boundary is not a reach break; it is the end of the video survey.

Reach 6 flows through a low lying valley bottom with some associated swamps/ponds. The meandering channel is well defined with stable vegetated banks. Excellent spawning gravel (70 % of bottom substrate), and juvenile rearing habitat for salmonids is present.

Unnamed Tributary #1 (Reach 1)

Length = 1.6 km
Downstream boundary = 10.5319.62057
Upstream boundary = 10.5306.62050
Location: From confluence with Gaylard Creek (approximately 1 km downstream of Reach 5/6 break) to 1.6 km upstream on unnamed tributary #1. The upstream boundary is not a reach break, it is the end of the video survey.

This tributary enters the top end of Reach 5. The lower 1 km of this tributary flows through a large cutblock. The substrate in this lower section is primarily small cobble and large gravel. The surveyed section of the tributary is typified by shallow (0.1 m depth) riffle habitat with a wetted width of nine metres and a gradient of 1 %. Very little cover is evident through the cutblock. Upstream of the cutblock, gradient increases, and the stream is confined in a narrow valley. Overstream cover (crown closure) increases to nearly 100% as the forest extends to the stream banks. Habitat for salmonids is probably limited to juvenile rearing.

DISCUSSION

The primary objectives of this reconnaissance survey were to assess the fish habitat of Gaylard Creek, and to determine if a bull trout transplant to the creek was feasible. This assessment of habitat suitability was directed towards salmonid species, with particular emphasis towards bull trout. The habitat requirements for bull trout documented by McPhail and Baxter (1995) were used to assess the habitat present in Gaylard Creek.

Spawning Habitat

Thurber Consultants (1975) suggested a fish ladder could be constructed at the first upstream barrier to fish passage on Gething Creek. A fish passage structure would provide access to approximately 500 m of Gething Creek habitat, and 500 m of Gaylard Creek habitat. However, the useable fish habitat that would be attainable is extremely restricted due to additional waterfalls and high flow events. Although Reaches 4 and 5 lacked appropriate spawning habitat, adequate spawning habitat (low silt content and small gravels < 20 mm diameter) as defined by McPhail and Baxter (1995) was located in the other reaches. If fry production is later discovered to be a limiting factor to population size, artificial spawning platforms could be constructed.

The threshold spawning water temperature for bull trout is approximately 9 °C (McPhail and Baxter 1995). Mean water temperatures reached 9 °C in Gaylard Creek by September 4 and remained appropriate throughout the spawning period of September to October. Optimal water temperature for egg incubation is reported as 2 °C to 4 °C (McPhail and Murray 1979). No overwinter water temperatures for Gaylard Creek have been collected. Water temperatures are being collected for the winter of 1994/95 and should provide data necessary to determine egg incubation time and related survival consequences. Based on water temperatures found at another creek in the area (Carbon Cr.), the water temperature of Gaylard Creek for the incubation period will not rise above 4 °C, but are likely to drop to 1 °C in the December to March months. This lower than optimal water temperature may prolong the incubation period slightly, but should not result in any adverse effects. A transplant of bull trout in 1993 to Gething Creek (similar water temperatures) resulted in successful egg deposition and recruitment of juveniles. Fry (n=21) were captured in Gething Creek on July 6, 1995. The mean fork length, and weight of these fish was 36 mm and 0.5 g respectively.

Juvenile Habitat

The absence of, or infrequent presence of, instream and overhead cover was a common occurrence in Gaylard Creek, with the exception of Reach 5. Nakano et al. (1992) emphasised the importance of cover, especially overhead cover for juvenile bull trout. McPhail and Murray (1979) suggested that the carrying capacity of streams for juveniles may be a major "bottleneck" in bull trout production. Their findings indicated that adult population densities in the Arrow Lakes were influenced by the carrying capacity of the spawning streams. Additionally, fish that stream reared for two to three summers had higher probabilities of survival upon lake entry than fry. Similar results were reported for Lake Koocanusa (Libby Reservoir) by Chisholm et al. (1989).

The present limiting factor to bull trout production in Gaylard Creek may manifest itself as limited cover for juveniles, thereby reducing the carrying capacity of Gaylard Creek. Once carrying capacity is reached, "excess" juveniles would emigrate downstream to Dinosaur Reservoir. Emigration of a portion of an established bull trout population to Dinosaur Reservoir is desirable; however, it would be more desirable to maximise emigration of two and three year old fish as opposed to fry. Stream enhancements in the form of instream cover (debris catchers, boulder placement, pool creation) may be the most effective enhancement for Gaylard Creek.

Adult Habitat

Gaylard Creek habitat is suitable for supporting an adult "stream resident" bull trout population. The stream resident form of bull trout which typically live in smaller headwater streams are dwarfed (McPhail and Baxter 1995). Due to a lack or minimal presence of fish for prey, the larger lacustrine-adfluvial bull trout which would be transplanted here would emigrate out of the system shortly after spawning. Their offspring would likely become dwarfed if they remained as stream residents as their diet would consist almost entirely of insects. Juveniles which emigrate to Dinosaur Reservoir may shift their diet to piscivory and grow to the large sizes (greater than 700 mm fork length) of bull trout commonly found in Dinosaur Reservoir.

The minimal presence of cover and deep pools, particularly in Reach 2 and 3, may also reflect a shortage of useable habitat for adult holding and rearing. Pool construction, debris catchers, and boulder placement, may prove to be very beneficial enhancement options as they would also serve the purpose of increasing the carrying capacity of the creek for juveniles as well.

Fish Species Presence

A secondary objective of this survey was to identify the presence of any fish species in Gaylard Creek. Rainbow trout presence was confirmed by the capture of one juvenile, and discovery of numerous redds in Reach 4. Electrofishing did suggest that the densities of rainbow trout were very low, at least in the areas examined. These fish are the descendants of a one time stocking of rainbow trout which occurred in 1983. No other fish species were captured, or believed to be present. The degree of competition between bull trout and rainbow trout that would result from a bull trout transplant is unknown. "In Mackenzie Creek, McPhail and Murray (1979) found clear differences in habitat use by sympatric bull trout and rainbow trout" (McPhail and Baxter 1995). The under utilisation of much of the creek by rainbow trout may provide a suitable niche for a bull trout population to develop without adversely impacting the existing rainbow trout. However, the absence of any other fish species may result in predation of rainbow trout.

Fish Passage Barriers

The reconnaissance survey revealed the presence of numerous barriers to upstream fish migration in Reach 1 of Gaylard Creek. The height of these falls precludes any attempts to construct fish passage structures. Construction of a fish passage structure over the first barrier to upstream fish passage on Gething Creek is not cost effective. The benefits would be very low due to the limited amount (one kilometre), and poor quality of, habitat which would be accessible.

Downstream migration survival of large adult fish through this reach is highly unlikely. Juvenile fish may survive the long vertical drops due to their smaller surface area and lower body mass.

Any transplant of adult bull trout to this system will require transporting the adults past the falls in Reach 1, recapturing them after spawning and then transporting them back below the falls. A transplant of this type could result in a naturalised stream resident population, with emigration of a portion of the population to Dinosaur Reservoir.

To enhance the probability of a successful transplant program, special management of Gaylard Creek should be considered. McPhail and Baxter (1995) suggest the best way to improve adult bull trout survival is to protect the population from over-fishing and poaching by catch restrictions, gear regulations and angling closures. Gaylard Creek is currently closed to angling year round. Angling closures and restrictions which ensure no harvest of bull trout from Gaylard Creek should remain in effect at least until a self sustaining population has been created. Similarly, pressures to the existing habitat from logging and other human activity should continue to be closely monitored and regulated.

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APPENDIX I

(DFO/MOEP STREAM SURVEY FORMS)

DFO / MOEP
STREAM SURVEY FORM

Stream Name: [illegible] Creek (local) | Access: FT | Method:
Watershed Code: [illegible] | Reach No: 1 | Length(m): 1.5
Location: [illegible] | Map#: 92 B/1 | Site No: 1 | Lthaur(m): 1.0.0
UTM: [illegible] | Fish Card: Y N | Field: | Hist:
Date Y M D: 94 07 10 | Time: 13:00 | Agency: [illegible] | Crew: [illegible] | Air Photos:

C	PARAMETER	VALUE	METH
	Ave Chan Width (m)	1.3	
	Ave Wet Width (m)	1.1	
	Ave Max Riffle Depth (cm)	40	
	Ave Max Pool Depth (cm)	100	
	Gradient %	9.0	
	% Pool: [illegible] Riffle: 20 Run: [illegible] Other: 100		
	Side Chan %	0 [X] 10 [ ] 10-40 [ ] 40 [ ]	
	Debris: Area %	0 [X] 1 [ ] 1-10 [ ] 10 [ ]	
	Stable %	0	
	COVER Total %	25	
	Comp: Bo Rub Cob Boulder Veg Ove Veg Chan		
	100% 30 0 70 0 0 0		
	Crown Closure % 25	Aspect	

C	BED MATERIAL	%
	Fines (<0.06 mm)	10
	Gravels (0.06 - 64 mm)	20
	Larges (64 - 4000 mm)	30
	Bedrock (R)	40
	Comments: [illegible]	

C	BANKS					
	Height	40	Angle	20		
	Texture	F	R	L	B	
	Continuity	EV	CO	FC	OC	UC	NA
	Valley Chan %	0-2	2-5	5-10	10+	NA
	Stage	Dry	L	M	H	Flood
	Flood Signs (m)					
	Bars (%)	0			Organic	
	Bank Stab					

OBSTRUCTIONS			
C	H(m)	Type	Loc n
	5/6	F	0.5
	20	C	1.2
	?	C	1.1

DISCHARGE

	Parameter	Value	Method	Quality Code
1	Wetted Width (m)			
	Mean Depth (m)			
	Mean Velocity (m/s)			
	Discharge (m³/s)			

REACH SYMBOL

FISH SUMMARY

C	Species	No	Size Range (cm)	Life Phase	Use	Method / Ref

STREAM VALLEY CROSS-SECTION
Looking Downstream

L R

PLANIMETRIC VIEW

[illegible]

COMMENTS

Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc

1 DISCHARGE COULD NOT [illegible]
2 [illegible]
3 [illegible]
4 THE [illegible]
5 SURVEY TO UPSTREAM [illegible]
6 [illegible]
7 CASCADES/CHUTE UNDER [illegible]

DFO / MOEP

STREAM SURVEY FORM

Stream Name (gaz.): Gaylard Creek (local): Access: FS Method:

Watershed Code: 230 815 045 000 000 000 000 000 000 000 Reach No: 2 Length(m): 2.0 MW

Location: Approx 1.7 km upstream from mouth (where Gaylard C. enters Gething C.) Map #: 93 G/16 Site No: Linear(m): 500 MW

UTM: 10, 585, 6009 Fish Card: Y (N) CF Field: X Hist:

Date Y M D: 94 07 09 Time: 11:00 Agency: F.S. Crew: K.F. M.H. J.P. Photos: 95/2-17 Air Photos: —

C	PARAMETER	VALUE	METH
	Ave Chan Width (m)	40	AE
	Ave Wet Width (m)	8	AE
	Ave Max Riffle Depth (cm)	60	AE
	Ave Max Pool Depth (cm)	100	AE
	Gradient %	1.0	MW
	% Pool: Riffle: Run: Other:		AE
	Side Chan %: 0 0-10 10-40 >40		AE
3	Debris: Area% 0 0-5 5-15 >15; Stable %	50	AE
	COVER Total %	40	AE
	Conif (≥ 3m): Decid (≥ 3m): Shrub (< 3m): Herbs:		
	Cover (Above %): Algae:		AE

SPECIFIC DATA

OBSTRUCTIONS

C	Hist	Type	Loc

C	BED MATERIAL	%	
8	Fines (< 2 mm)	0	0
	Gravels (2 mm - 6 cm)	20	20
	Large (6 cm - 25 cm)	60	35
7	Boulders (25 cm - 4 m)		10
	Bedrock (R)		

C	BANKS	
7	Height: 1.0 Elevation:	
	Texture: F S G B	

Confinement: EN CO FC OC UC N/A

Valley Channel Ratio: 0-1 1-2 2-10 10+ N/A

Stage: Dry L M H Flood

Flood Signs (mm): 0.5 Present: Y N

Bank Material: Bank Vegetation:

DISCHARGE

Parameter	Value	Method
Wetted Width (m)		
Mean Depth (m)		
Mean Velocity (m/s)		
Discharge (m³/s)		

REACH SYMBOL

FISH SUMMARY

C	Species	No	Size Range (mm)	Life Phase	Use	Method/Ref

STREAM VALLEY CROSS-SECTION (Looking Downstream)

L R

PLANIMETRIC VIEW

COMMENTS

Channel Stability / Debris / Management Concerns / Disturbance / Riparian Zone / Valley Wall Processes / Etc.

1 East

2 Reach appears to have good rearing habitat for fish present

3 Slight natural turbidity present in water. Appears due to flowing up

4 Bed material consists of mostly cobble and some large gravels

5 No estimate of discharge could be made from the helicopter

6 Aerial estimate

7 Aerial estimate

8 Aerial estimate

* ALL BED MATERIAL VALUES OBTAINED BY AERIAL ESTIMATION

DFO / MOEP
STREAM SURVEY FORM

Stream Name: Gaz Gaylord Creek (local) — Access: — Method: —

Watershed Code: 23 B 15 00 [illegible] — Reach No.: 2 — Length: 9.3

Location: 500 m upstream of bridge on Rd 503 at the Park Creek FSR — Map #: 94 G/1 — Site No.: — — Lthaurs/mi: 3.56

UTM: [illegible] — Fish Card: (Y) N — Field: (Y) Hist: —

Date Y M D: 94 07 11 — Time: 12:12 — Agency: EG — Crew: [illegible] — Photos: — — Air Photos: —

C	PARAMETER	VALUE	METH
	Ave.Chan.Width (m)	31.5	
	Ave.Wet Width (m)	10.0	
	Ave.Max Riffle Depth (cm)	55	MS
	Ave.Max Pool Depth (cm)	125	MS
1	Gradient %	1.4	AL
5	%Pool / %Rifle 35 Run 15 Other		
	Side Chan %		
	Debris Area%		
	Debris Static %	2	
	COVER Total %	70	
	Cover Types: Undercut / Boulder / Log / Deep Pool / Other		
	Cover Amount: 100% 10 / 10 60 / 0 / 0 / 0		
	Gravel Recruit % 10	Algae:	

SPECIFIC DATA: SEE BIOPHYSICAL SURVEY #1 IN APPENDIX II

C	BED MATERIAL	%
	Fines (S)	10
	Gravels	20
	Larges	70
	Bedrock (R)	

C	BANKS	
	Height: L 1.5 R 1.5	%Undercut: L 60 R 60
	Erosion: L 0 R 0	

Confinement: (EN) Di FC Co VC N/A

Valley Channel Ratio: 0-2 2-5 (5-10) 10+ N/A

Stage: Dry L M (H) Flood

Fluvial Signs Width: 2 Stability: P (N)

Bank %: 20 — Bank Type: —

Bank %: 70 Substrate: 20 — Bank Type: —

OBSTRUCTIONS

C	Ht(m)	Type	Loc'n

DISCHARGE

	Parameter	Value	Method	Quality Code
6	Wetted Width (m)			
	Mean Depth (m)			
	Mean Velocity (m/s)			
	Discharge (m³/s)			

REACH SYMBOL

FISH SUMMARY

C	Species	No	Size Range (mm)	Life Phase	Use	Method/Ref
9	RB	1	140	J	R	EL

STREAM VALLEY CROSS-SECTION

L R

PLANIMETRIC VIEW

COMMENTS

Channel Stability: Debris: Management Concerns: Obstructions: Riparian Zone: Valley Wall Processes: Etc.

1 [illegible]

2 Good access (East)

3 Stream appears to meander (east) SE-NW

4 Wide flats, high flood sign[illegible]

5 [illegible]

6 MEADOWES with meanders

7 Fish washed [illegible]

DFO / MOEP
STREAM SURVEY FORM

Stream Name (gaz): Gaylard Creek (local)
Watershed Code: 230-815-800-450-000-000-000-000-000-000
Location: Johnson Creek E.S.R. Bridge
Crossing At 5.15 Km Mouth (upstream)
Date Y M D: 96 07 12 Time: 15:37 Agency: MOEP Crew: A.L. R.Z.
Access: V2 Method:
Reach No: Length (m): 2.71
Map #: 94 B/11 Site No: Lithsurvmt: H20 ST
UTM #: 5371620 76 Fish Coll: N 6 Field X Hist:
Air Photos:

C	PARAMETER	VALUE	METH
	Ave Chan Width (m)	14.5	ST
	Ave Wet Width (m)	14.5	ST
	Ave Max Riffle Depth (cm)	20	MS
	Ave Max Pool Depth (cm)		MS
	Gradient %		AL
	% Pool: Riffle: Rapid: Other:		ST
	Side Chan %: dd [X] w [ ] sd [ ] sl [ ]		ST
	Debris: Area% [ ] s [ ] d [ ] w [ ] sl [ ]		ST
	Stable %		GE
	COVER Total %		GE
	Cover Types: Boulder / Bedrock / Large Woody / Undercut / Other		
	Rank: 50 5 0 0 5		10
	Cover Density: 5		CE

SPECIFIC DATA
Fish Habitat Biophysical Survey 2
See Appendix IV

C	BED MATERIAL	%	%
	Fines (<2 mm)	90	90
	Gravels (2-75 mm)	10	95
	Larges (>75 mm)	0	05
	Bedrock (R)		

Compaction: N M H

C	BANKS		
	Height: Lt 10 Rt 50		
	Texture: C S L H		
	Cohesion: BN SD C OC N/A		
	Veg Cover: 0-2 2-5 5-10 (>10) N/A		
	Stage: Dry L M (H) Flood		
	Point Bar: Size: 0.5 Extent: S (L)		
	Bank Material: D		
	Bank Width: 2.5		50

OBSTRUCTIONS

C	Hmbt	Type	Loc'n

DISCHARGE

Parameter	Value	Method	Quality Code
Wetted Width (m)	15	RF	
Mean Depth (m)	0.6	GE	
Mean Velocity (m/s)	0.25	FLOAT	0.75m [10m / 44.8m] 0.25m
Discharge (m³/s)	1.69	FLOAT	DF x .75 x .10 x .75

REACH SYMBOLS

FISH SUMMARY

C	Species	No	Size Range (mm)	Life Phase	Use	Method/Ref
	?	3	-	E		VE

STREAM VALLEY CROSS-SECTION
Looking Downstream
PLANIMETRIC VIEW

COMMENTS
Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Fish

1 Turbidity - water still muddy, colour = Jacuzzi / Brown
2 Substrate - 90% sand and silt
3 Common Name - N/A
4 Eggs found at a redd site. Eggs probably PR
5 Spawning start (est) method.
6 Electrofished right bank at the site. No fish captured.
6 Redd site and eggs observed.
10 Approx. 100 m² observed.

DFO / MOEP
STREAM SURVEY FORM

Stream Name (gaz): Gaylard Creek (local):
Watershed Code: 230-615607500-0000-0000-0000-0000
Location: Approximately 6 km upstream from the bridge crossing on the Iskut C.F.S.R. in SE
Map: 94 B/1
UTM: 10 534G 6206G
Date Y M D: 94 07 09
Time: 11:00
Agency: EG
Crew: B.B. M.H B.T.
Photos: #5/32-37
Reach No.: 5
Site No.:
Fish Card: Y (N)
Air Photos: —
Access: F
Method:
Length (km): 7.6 AW
Upstream (m): 7000 AW
Field: X
Hist:

C	PARAMETER	VALUE	METH
	Ave Chan Width (m)	10	AE
	Ave Wet Width (m)	7	AE
	Ave Max Riffle Depth (cm)	40	AE
	Ave Max Pool Depth (cm)	50	AE
1	Gradient %	0-1	AE
	% Pool 5 0 Riffle 1 Other 6 Dune 10		AE
	Side Chan % 5 0 4 0 3 0 2 0 1 0		AE
	Debris Area % 5 0 4 0 3 0 2 0 1 0		AE
	Debris Stable % 90		AE
	COVER Total % 30		AE
	Cover Type Code 6 40 10 0 30 20		
	Other Cause % 30 2 Algae		AE

SPECIFIC DATA

C	BED MATERIAL		%	
3	Fines	clay & silt (< 2 mm)	90	90
3	Gravels	sand (2-16mm)	10	10
		pea (16-64mm)		0
3	Larges	cobble (64-256mm)	0	
		boulder (>256mm)		
3	Bedrock (R)		0	
3	D50 (cm) 10	Compaction L M H		

C	BANKS			
4	Height (m) 0.5	Vegetation 10		
4	Texture B G	L	R	

OBSTRUCTIONS

C	Hmin	Type	Loc'n

Confinement — EN CO RO OC (CO) N/A
Valley Channel Ratio 1:1 2 3 5 10 (10) N/A
Stage Dry L M (H) Flood
Flood Signs (m/cm) 0.2 Historic (0) N
Bars % 0 Silt — Algae —
Water Temp (°C) — Turbidity — Conductivity —

DISCHARGE

	Parameter	Unit	Method	Specific Data
5	Wetted Width (m)			
	Mean Depth (m)			
	Mean Velocity (m/s)			
	Discharge (m³/s)			

REACH SYMBOL
Plan

© Province of British Columbia

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method/Ref.

STREAM VALLEY CROSS-SECTION
(Looking Downstream)

L R

PLANIMETRIC VIEW

COMMENTS
Channel Stability Debris Management Concerns Obstructions Riparian Zone Valley Wall Processes Etc

1. Gradient appears to be quite low, estimated between 0 + 1 %.
2. Sept
3. This reach was surveyed only by air and not by ground. Reach appears to be slow moving with an organic bottom (mostly fines, little gravel present)
4. Bank estimates banks are quite low, mostly vegetated
5. No estimate of discharge was performed as this reach was surveyed by helicopter and not by ground.
6. This area acts as a catchment basin for many other tributaries of Bayard Creek (good rearing habitat).

DFO / MOEP
STREAM SURVEY FORM

Stream Name (gaz) Gaylard Creek (local)
Access V2 Method
Watershed Code 230815604500000000000 Reach No. 0 Length(km) 2.3
Location at Km 57.5 on the Johnson Creek FSR Maps 94 B/2 Site No. — Lithsurvim 200 ST
upstream of culvert UTM 05 513.62063 Fish Card Y (N) FS Field X Hist.
Date Y M D 94 07 11 Time 15.45 Agency FG Crew RB MC KL Photos Nos Air Photos —

C	PARAMETER	VALUE	METH
	Ave.Chan.Width (m)	5	ST
	Ave.Wet.Width (m)	5	ST
	Ave.Max.Riffle Depth (cm)	35	ST
	Ave.Max.Pool Depth (cm)	40	ST
1	Gradient %	2.0	MW
	%Pool Riffle Run 90 Other 10		GE
	Side Chan.% 0 (X) 0-10 10-20 >40		GE
	Debris Area% 0 (X) 0-5 5-15 >15		GE
	Debris Stable % 0		GE
	COVER Total % 35		GE
	Comp. Sum 100% 20 / Bo.Rot 0 / L.OM 0 / Boulder 40 / Bed.Veg 40 / Others		
	Crown Closure % 35 / 2 Aspect		

SPECIFIC DATA

C	BED MATERIAL	%
	Fines (silt/clay/sand <2mm)	20
	Gravels (small 2-16mm; large 17-64mm)	70
	Larges (small 65-128mm; large 129-256mm; boulder 257-4096mm)	10
	Bedrock (R)	0
	D50 — / Compaction L M (H)	

C	BANKS				
	Stability	1-5	Unstable	0	
	Texture	C	O	L	R
	Confinement	CN	CO	FC	OC (VC) N/A
	Valley Channel Ratio	0-2	2-5	5-10	(>10) N/A
	Stage	Dry	L	M	(H) Flood
	Flood Signs (mm) 0.5	Shelter	Y	(N)	
	Data (N) 5	pH —	Cl (ppm) —		
	Water Temp (C) 9	Turbidity 30	Conductivity —		

OBSTRUCTIONS

C	Hbmt	Type	Loc'n

DISCHARGE

	Parameter	Value	Method	Specific Data
3	Wetted Width (m)	4.5	ST	Pass 1 = 5.5 m, Pass 2 = 3.5 m
4	Mean Depth (m)	0.4	MS	Pass 1 = 4.8 sec. over 2m length
5	Mean Velocity (m/s)	1.4	FOM	x = 5 seconds
6	Discharge (m³/s)	1.78	FOM	

REACH SYMBOL (Local)

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method/Ref

STREAM VALLEY CROSS-SECTION (looking downstream)

L PLANIMETRIC VIEW R

COMMENTS

Channel Stability / Debris / Management Concerns / Obstructions / Riparian Zone / Valley Wall Processes / Etc

1 No gradient estimates were taken in the field
2 Ground Estimate (South)
3 Meandering run with a lot of undercut banks and overhanging vegetation.
3 Good spawning potential, but a lot of fines and compaction.
4 Estimates from July 12, 1994 [illegible] effect

DFO / MOEP
STREAM SURVEY FORM

Stream Name: (gaz.) | Local: Unnamed tributary of Bayford Creek | Access: VE | Method:

Watershed Code: [illegible] | Reach No: 1 | Length: 1.4m

Location: Km SE on Johnson Creek Rd. | Map#: 94 B/2 | Site No: | Lat/Lon/UTM: 2m SE

Rd. | UTM: 10 5304 6208 | Fish Card: Y N | Field: Hist:

Date Y M D: 95 07 13 | Time: 15:15 | Agency: EG | Crew: [illegible] | Air Photos:

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave. Chan. Width (m)	3	ST	
	Ave. Wet Width (m)	3	ST	
	Ave. Max Riffle Depth (cm)	15	ST	
	Ave. Max Pool Depth (cm)	60	ST	
1	Gradient %	1.0	GE	
	% Pool 5 Riffle 5 Plan Other 15		GE	
	Side Chan %	[X] 0-5 [ ] 5-40 [ ] >40	GE	
	Debris: Area %	[ ] 0 [ ] 0-5 [X] 5-15 [ ] >15	GE	
	Stable %	0		
	COVER Total %	20	GE	
	Comp Type (Rip, Rub, Veg, Undercut, Over Veg, Man)			
	Amt (less than 15%)	5 - 10 - 20	5	
	Growth Stage %	5	2 Accept GE	

C	BED MATERIAL	%
	Fines (silt/clay/muck <2mm)	15
	Gravels (2mm to 64mm)	25
	Larges (64mm to 256mm)	60
	Bedrock (>256mm)	0
	Type: 25 Embeddedness: L M H	

C	BANKS	
	Height:	Stability: 0
	Texture: F (G) L R	
	Confinement:	EN CO FC (VC) HC N/A
	Valley Chan %	0-5 5-15 (15-50) >50 N/A
	Stage	Sky: M (H) Flood
	Flood Scars (How?)	1 Recent: (Y) N
	Debris: 15	Log: — Length: —
	Max Pool: 9	Width: 30 Width: —

DISCHARGE

	Parameter	Value	Method	Specific Data
1	Wetted Width (m)	3	ST	Pass 1: 21.2 sec, Pass 2: 14.5 sec
1	Mean Depth (m)	0.12	ST	Ave 1: 19.8 sec Ave 2: 16.2
1	Mean Velocity (m/s)	0.625 EST		A = 1/sec = 0.61 m/s
1	Discharge (m³/s)	0.45 Est		

REACH SYMBOL

FISH SUMMARY

C	Species	No.	Size Range (cm)	Life Phase	Use	Method/Ref.

STREAM VALLEY CROSS-SECTION (Looking Downstream)

PLANIMETRIC VIEW

COMMENTS

Channel Stability | Debris | Management Concerns | Observations | Riparian Zone | Other Wet Photos? | ETC

1 See July 12 '95 field notes [illegible]

[illegible] estimate about 1% gradient

2 Ground estimate (east)

3 Creek flows through a large clearcut

3 Many [illegible] present (Cm. atlantic, coho, fry)

3 Some spawning habitat present

APPENDIX II

(DETAILED BIOPHYSICAL DATA)

BIOPHYSICAL SURVEY 1

SYSTEM NAME:	Gaylard Creek	SURVEY UTM:	10 5412 62074	MAP:	94 B/1
WATER TEMP.:	9 (C)	DATE:	July 11, 1994	REACH LENGTH:	9.5 km
REACH #:	3	CREW:	B.B./M.H./R.Z.	LENGTH SURVEYED:	386 m.

LOCATION: Starts 300 m upstream from bridge crossing on the Table Creek F.S.R. km 0.7.

HABITAT TYPE	LENGTH (m)	WETTED WIDTH (m)	AREA (m2)	CHANNEL WIDTH (m)	SPAWNING HABITAT %	MEAN DEPTH (cm)	MAXIMUM DEPTH (cm)	D-90 (cm)	SLOPE RISE (cm)	SLOPE RUN (m)	SLOPE %	INSTREAM COVER FRY	INSTREAM COVER PARR	INSTREAM COVER ADULT	OVERSTREAM COVER CROWN	OVERSTREAM COVER OVERHANG	COMMENTS
R	30	10	300	50	0	30	50	40	21	30	0.7	30	50	0	0	0	banks 100% unstable
RN-R	26	10	260	50	0	45	85	45	86	26	3.3	40	40	10	0	0	
R-G	30	10	300	33	0	50	60	45	22	30	0.7	20	30	0	0	0	small deb jam, 60% unstable
R	75	11	825	28	0	50	80	70	88	75	1.2	10	70	15	0	10	
G	34	12	408	29	0	40	50	35	15	34	0.4	25	40	0	0	0	
R	14.5	14	203	25	0	25	40	25	17	14.5	1.2	15	60	10	0	0	small log jam
P	20	9	180	28	10	70	125	15	0	20	0.0	15	80	50	0	0	debris jam
R	41	9	369	47	0	60	80	35	80	41	2.0	10	60	0	0	0	large slump right bank
P-RN	24.5	11	269.5	16	0	60	100	25	0	24.5	0.0	10	50	40	0	0	debris jam, undercut banks
G-R	66	9	594	15	0	40	60	25	19	66	0.3	20	50	0	0	0	
RN	25	8	200	27	10	60	90	35	7	25	0.3	10	70	20	5	0	1 LOD

SURFACE AREA	3908.5	sq. m.
LENGTH	386	m.
MEAN WETTED WIDTH	10.13	m.
SPAWNING AREA	38	sq. m.
SPAWNING HABITAT	0.97	%

	sq. m.	%
AREA OF RIFFLE	2216.6	56.8
AREA OF POOL	341.7	8.7
AREA OF RUN	463.8	11.9
AREA OF GLIDE	884.4	22.6
TOTAL	3908.5	100

MEAN MAX POOL DEPTH	125	cm.
MEAN CHANNEL WIDTH	30.5	m.
MEAN MAX RIFFLE DEPTH	85	cm.
MEAN D-90	35.91	cm.

	sq. m.	%
area of riffle	1697	43.4
area of pool	180	4.6
area of run	200	5.1
area of glide	408	10.4
area of r-p	0	0.0
area of r-rn	0	0.0
area of r-g	300	7.7
area of p-r	0	0.0
area of p-rn	269.5	6.9
area of p-g	0	0.0
area of rn-r	260	6.7
area of rn-p	0	0.0
area of rn-g	0	0.0
area of g-r	594	15.2
area of g-p	0	0.0
area of g-rn	0	0.0
TOTAL	3909	100

BIOPHYSICAL SURVEY 2

SYSTEM NAME:	Gaylard Creek	SURVEY UTM:	10 5371 62078	MAP #:	94 B/1
WATER TEMP:	8.5 (C)	DATE:	July 11, 1994	REACH LENGTH:	2.7 km
REACH:	4	CREW:	B.B./M.H./R.Z.	LENGTH SURVEYED:	460 m

LOCATION: Starts 20 m upstream from bridge crossing on the Johnson Creek F.S.R. km 51.5

HABITAT TYPE	LENGTH (m)	WETTED WIDTH (m)	AREA (m2)	CHANNEL WIDTH (m)	SPAWNING HABITAT %	MEAN DEPTH (cm)	MAXIMUM DEPTH (cm)	D-90 (cm)	SLOPE RISE (cm)	SLOPE RUN (m)	SLOPE %	INSTREAM COVER FRY	INSTREAM COVER PARR	INSTREAM COVER ADUL	OVERSTREAM COVER CROWN	OVERSTREAM COVER OVERHANG	COMMENTS
P	30	14	420	14	0	180	230	0	0	30	0	10	50	40	10	10	mud bottom
R	15	7.5	112.5	7.5	0	50	70	35	5	15	0.3	10	50	0	5	15	
P	15	8	120	8	0	75	100	0	0	15	0	0	20	20	0	10	side pool present, mud bottom
P-G	400	15	6000	15	0	60	100	10	0	400	0	5	15	10	5	5	small side channel

SURFACE AREA	6653	sq. m.
LENGTH	460	m.
MEAN WETTED WIDTH	14.5	m.
SPAWNING AREA	0	sq. m.
SPAWNING HABITAT	0	%

	sq. m.	%
AREA OF RIFFLE	112.5	1.7
AREA OF POOL	4140	62.2
AREA OF RUN	0	0
AREA OF GLIDE	2400	36.1
TOTAL	6652.5	100

MEAN MAX POOL DEPTH	165	cm
MEAN CHANNEL WIDTH	14.5	m.
MEAN MAX RIFFLE DEPTH	70	cm
MEAN D-90	11.3	cm

	sq. m.	%
area of riffle	112.5	1.7
area of pool	540	8.1
area of run	0	0.0
area of glide	0	0.0
area of r-p	0	0.0
area of r-rn	0	0.0
area of r-g	0	0.0
area of p-r	0	0.0
area of p-rn	0	0.0
area of p-g	6000	90.2
area of rn-r	0	0.0
area of rn-p	0	0.0
area of rn-g	0	0.0
area of g-r	0	0.0
area of g-p	0	0.0
area of g-rn	0	0.0
TOTAL	6653	100

APPENDIX III

ELECTROFISHING DATA

Electrofishing

Electrofishing Site 1.

Date	July 12, 1994 Crew A.L., R.Z.
Location	Unnamed tributary Reach 1. At 58.5 km point on Johnson Creek F.S.R., take road on left, drive 0.7 km, Gaylard Creek on left side
U.T.M.	10.5304.62052
Water temperature	9.0° C @a 11:30
Length shocked	100 m
Ave. width	7.5 m
Ave. depth	0.2 m
Mean velocity	0.625 m/s
Fish captured	none
Comments	1) substrate consists of gravel and small cobble 2) area is 95 % riffle, 5 % small pools

Electrofishing Site 2.

Date	July 12, 1994 Crew A. L., R.Z.
Location	Reach 6. At 57.5 km point on Johnson Creek F.S.R.
U.T.M.	10.5313.62063
Water temperature	9.0° C @ 14:00
Length shocked	250 m (150 m d/s of culvert, 100 m u/s of culvert)
Ave. width	4.5 m
Ave. depth	0.55 m
Mean velocity	1.4 m/s
Fish captured	none
Comments	1) substrate consists of gravel and fines

Electrofishing Site 3.

Date	July 12, 1994 Crew A. L., R.Z.
Location	Reach 4. At 51.5 km point on Johnson Creek F.S.R. (upstream of bridge)
U.T.M.	10.5371.62078
Water temperature	*8.5° C* @ 16:00
Length shocked	300 m
Ave. width	3 m
Ave. depth	unknown
Mean velocity	0.25 m/s
Fish captured	none
Comments	1) deep pools present (depth unknown) 2) electroshocked wherever shallow enough 3) turbid water due to rain

Electrofishing Site 4.

Date	July 13, 1994 Crew A.L., R.Z.
Location	Reach 3. 100 m upstream of bridge at km 0.7 of the Table Creek F.S.R.
U.T.M.	10.5412.62074
Water temperature	11° C @ 12:00
Length shocked	225 m
Ave. width Ave. depth Mean velocity Fish captured	3m unknown unknown 1 rainbow trout length = 141 mm weight = 35.2 g age = 2 + years
Comments	1) lots of invertebrates present

APPENDIX IV (LEGEND

FOR FIGURE 2)

Legend for Figure 2

[- End or beginning of video survey.

W- A major bank or valley side wall slope zone (typically glacial till eroding banks)

X- Persistent debris accumulation (log and debris jams)

⟼ R#- Reach boundary and number. Number is placed at upstream reach boundary.

*- General zone of flood and side channels.

><- Bridge.

—{16R- Site - specific channel features are symbolized as follows:
R (Rock) Bd (Beaver Dam)
L (Logs) C (Cascade/Chute)
Heights (m) if available, are indicated as numbers before symbols.
(e.g. 3R = 3 m rock falls).
Length (m) is indicated as a number after the symbol.
(e.g. C50 = 50 m long cascade/chute).

⊥- Swamp or marsh area.

Reach Symbol example

Rb (DV) ——— Fish species present, ( ) denote species presence probable.

9A0.7 | 0280 ——— Bed (Substrate) Materials.
Fines (0%) materials in the 0 - 2 mm size class.
Gravels (20%) materials in the 2 - 64 mm size class.
Larges (80%) materials greater than 64 mm.
Bedrock (0%) consolidated materials.

Channel Components
Channel width (m) = 9 m
The ratio between width of valley flat and width of channel = A
A rated 0 - 2
B rated 2 - 5
C rated 5 - 10
D rated 10+
E rated N/A (e.g. fan or delta)
Slope (stream gradient) = 0.7 %